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# THE HUMAN MIND

## A SUGGESTION AS TO THE CONSTITUTION OF NORMAL, SUB-NORMAL AND SUPERNORMAL MIND

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In this discussion of the constitution of human mind no arrogant assertions are set forth; it is, merely, that the writer wishes to indicate what appears to him to have been the phylogenetic course in the development of mind. Following the discussion we shall discover that an understanding of the process will lead to, not only an understanding of normal mind, but, also, of subnormal mind and of supernormal mind. We shall discover, in fact, that these phases of mind correspond very closely to the three major divisions of time. That is, that normal mind appears as Present; subnormal mind as Past; and supernormal mind as Future.

### I

Involved in any discussion of the human mind is the answer to that ever-recurring question, What is mind? for there can be no intelligent discussion of mind until this question is answered. And, so, we find ourselves confronted by this question here, at the very beginning of our discussion. *What is mind?* From whence does mind proceed? Is it spiritual or material? Supernatural or natural? Is it an emanation or an expression? And how shall we reply to the question here presented, for, there is but one, after all. Examining the question carefully, we find that it is far from being an easy one to answer. It becomes in fact, very subtle and far-reaching, for, we find, that any answer that we may give to it, only suggests another question.

For instance, if we affirm that mind is a spiritual emanation, is supernatural, the query comes back, first, What is a spiritual emanation? and, second, Where does the supernatural lie? Or, if it be affirmed further that mind is a natural manifestation, an expression of organic action, again are we beset by questions. How does the natural differ from the supernatural? And, if the reaction is organic, does it pro-

ceed through a single organ? or, are all the organs involved? And these questions, as may be seen, open up a discussion in which the further questions fly thick and fast.

The difficulties of the original question now become apparent. Mind may not be described offhand by a word or two; it is a many-angled complex, and its description must embrace *all* the angles. Mind is, in my view, an organic complex in which the manifestation is through a single organ. We approach that organ through the following formula. Mind is consciousness; consciousness is recognition; recognition is memory; and memory is that faculty of the cerebral cells by means of which past experience may be recalled: In the ultimate analysis, then, mind appears as conscious memory, as memory *plus* consciousness, as *memory directed by consciousness*. Memory without consciousness would not be mind; it would be merely reflex action, merely memory revived through the reflex. All living cells have this reflex memory, but conscious memory is visible in only a certain few. Through reflex memory the cell knows what to do when an external stimulus tells it what to do; but the stimulus always is external to the cell itself. The cell possessing conscious memory, on the other hand, being self-directing, can originate an impulse. While an external stimulus can call it into action, it does not require the external stimulus.

The distinction here is a rather fine one. The situation suggests the question: If mind embraces recognition why is not reflex action mind? In the reflex there *is* recognition, else there could not be response. But there are two characteristics of the reflex that keep it always a reflex: It is inflexible, that is, the reaction is always the same; and, there is no recognition of the act after the reaction has been completed. In the reflex arc there is no true consciousness, there is only reflex recognition, just a quick, evanescent flash that leaves no conscious memory in its wake. In the thought cells of the cerebrum the reaction is different, is more complicated. We may have here this same reflex action, just reflex recognition; but we may have, also, true consciousness. Consciousness may oversee the reaction: it may receive the incoming stimulus, consider it, and return an answer or not, as it sees fit. The thought reaction is flexible where the reflex is inflexible; it has the slower, *directed* movement of real thought, while the other has the quicker, *limited*, movement of unthought. In thought the memory of the reaction remains in consciousness; in the reflex it does not.

I have said that mind is an organic complex in which the

manifestation is through a single organ; and we discovered that organ through our formula, for, having reached to the cerebral cells through it, we find ourselves within the brain itself. But now, the brain is not the only organ involved. All the organs of the body, in the degree in which they have to do with the well-being of the brain, support the reaction. All the organs are involved, but the brain is the organ of manifestation. Accepting this as a basis from which to proceed we find ourselves better able to go on with our examination into the constitution of mind. We now have reached a center from which our research may extend in all directions. Heretofore mind has been looked upon as something above brain, as something emanating from above the human plane; but now we perceive that, while the manifestation often does seem to be above the brain level, its origin actually is at that level.

The closer we examine mind as a manifestation of brain the more are we impressed by the fact that the brain is the basis of mind. Not that the cerebral cells *are* mind; they only are the basis of mind. If they were mind nothing more need be said, for the answer to the question What is mind? would then be obvious. The cerebral cell then would possess the power of supreme consciousness. But the cerebral cell does not possess that power, *not yet*, and hence the difficulty it has in understanding itself. That that is the goal toward which the cell is reaching becomes more and more apparent the deeper we go into brain history; it becomes apparent, also, that the cell still has some distance to go before it attains its goal.

And so, if we would understand mind we must understand brain; and so, if we are seeking a clear understanding of brain function, we must know something of brain history, and something of brain structure. Here history and structure go hand in hand, for, the story of brain structure is the story of brain development. This story has its beginning in the remotest of remote antiquity. So remote is it, in fact, that we have no direct knowledge as to it, such items as come to us being, as it were, but echoes that have grown faint through distance. But, as echoes, however faint, must have an origin in fact, so here, these echoes hark back to something more substantial than themselves. Advancing knowledge has enabled man to locate these echoes and to begin their classification; but it is only a beginning, for the problem is intricate and difficult, and is to be solved only through laborious effort, step by step. The echoes are not long graceful arcs revealing direct pathways between cause and effect. They are a series of short arcs mingled in apparent confusion extending in a long chain

between the remote point and the near. The difficulty here lies in tracing the proper connection between these intermediate points, in discovering the orderly sequence of the links of the chain. But already some of these points have been connected up, and now we are beginning to catch an idea as to the origin of the human brain. It is becoming more and more apparent that the human brain as we know it is but the present manifestation of a long process of evolution; that the human brain of today is but a sublimated animal brain. Among the several items already known that mark this fact, and which are, to my mind, conclusive, are the following. First. The test known as Nutting's biological blood test, as given in Vol. lxix, No. 453, of the "Proceedings of the Royal Society of London." Second. The remarkable resemblance, both macroscopically and microscopically, between the brain of man and the brain of the monkey, as revealed by the researches of a number of highly trained observers, and, especially by the exhaustive work of Dr. A. W. Campbell, of the Royal Society of London, as set forth in his book, "The Localization of Cerebral Function." Third. The obvious dominance of the animal (motor) brain in the developing brain of the child, and in the congenitally arrested brain in the feeble-minded. The first item reveals the close blood relationship between man and monkey; the second and third, their close brain relationship. Let us look into this a little more closely.

For the blood test Nutting prepares an antiserum by injecting human blood, intraperitoneally, into a live rabbit, one injection following another at intervals of three or four days until three or four injections have been made. The animal is then bled to death, and the anti-serum made from its blood. This serum added to dilute human blood causes a characteristic precipitate. Nutting has performed this test upon all known varieties of the vertebrates and has obtained the reaction in the bloods of but two: man and monkey. An interesting point here is that the blood of the old-world monkey gives a stronger reaction than does the blood of the new-world monkey. Nutting finds, also, that the bloods of different groups of animals tested by an anti-serum made from the blood of one of the group give a characteristic group reaction.

Campbell's researches have revealed a very suggestive similarity between the brain of the man and the brain of the chimpanzee. He finds the cellular and the fibre structure of the cerebral centres in the man brain practically duplicated in the chimpanzee brain, the difference between the two being, mainly, one of degree. The chimpanzee brain, mainly an animal

brain one-third the size of the man brain, has neither the area nor the development of the other. The man brain is a thought brain, but, in the chimpanzee, the motor (reflex) centres dominate. The activities of the chimpanzee follow through the motor centres, and these centres occupy a relatively greater area in its brain.

A report by Leyton and Sherrington in the *Quarterly Journal of Experimental Physiology* (Vol. XI, No. 2), on some experiments in cerebral localization upon anthropoid apes adds a further bit of evidence in favor of the contention that the ape brain and the man brain are closely related. The evidence is as follows: That the outlines of the motor area, as mapped out by Leyton and Sherrington, follow very closely the histological outlines of Campbell; that the motor responses induced by faradization of the anthropoid brain are very varied, approaching the movements of man in number; and that these movements are far more than those obtained from the dog or macaque.

Does the chimpanzee, or other anthropoid, think? That is a difficult question, but histology offers a suggestion toward an answer. The area in the chimpanzee brain corresponding to the so-called thought area in the man brain has the same cellular structure. The cells carry the same characteristics and follow the same arrangement, but they are fewer in number and lack in development; this "thought" area in the chimpanzee, while it is present, is very primitive. While brain cells are able to make themselves manifest, no brain cell can give a manifestation beyond the power of its own structure *and* development.

The point of greatest insistence in the animal (chimpanzee) brain is the predominance of the reflex, the predominance of the motor area. The actions of the animal *are* reflex. That is, his brain acts only in response to external stimuli. It is not a thought brain, it is an impulse brain; a reflex brain that seems to be capable of responding only when a stimulus is sent in to it. It cannot originate, it cannot think for itself, for this brain has not reached the stage of development where that becomes possible. Its thought cells have not come into consciousness, they haven't conscious memory; they do not *consciously* receive and record impressions. It is possible that they do receive impressions, but, if they do, that is as far as the reaction passes. At that point there is a hiatus; the impressions are received but not considered. There are two reasons for this. First: the animal hasn't language; and, second, as we have seen, he hasn't conscious mem-

ory. Memory in these cells is, as yet, entirely reflex; they can recognize an impulse, but they cannot, without the impulse, recall past experience. When a sensory impulse is received by this brain, one of two things happens. Either it returns an immediate reply, or, no reply at all is returned; it is reflex or nothing. This brain being a reflex (motor) brain, there can be no visible reply except through the motor apparatus. That is not to say, however, that, lacking the motor reply, there is no effect following the reception of the sensory impulse. That would be an impossibility. All stimuli *entering* the cortical cells, whether in the brute brain or in the man brain, leave some effect, however slight it may be. The effect may not be visible as a direct manifestation, but the effect remains as a permanent impression upon the cells, and, if it be repeated sufficiently often, it may, eventually, come into consciousness. In that event it becomes a part of the evolutionary process, for, it is increasing the power of the local area in the cerebral cortex; it is developing conscious memory therein. Following this argument it becomes more and more apparent that the man brain has developed through the brute brain; and we confirm the argument through the study of the child brain and the brain of the feeble-minded.

The combination of conscious memory and the higher centres has come from two directions: directly, through the reflex, and, indirectly, through muscular action. The entire process, then, may be traced to the effect of environment upon the individual; an environment ever-changing, persistent, at times almost overwhelming.

The pre-man was an individual of action, and, beginning man, being the immediate continuation of the other, possessed his characteristics. These two *animals* were nothing more than reflex automata, in whom the reflex arc was made up of environment, brain and muscle. Environment sent the message, the brain received it, and the muscles gave back the answer. In the reaction the brain was a passive agent; it did not direct the movements, it merely synchronized them. It could not direct, for it was a nonconscious organ, and was not aware of what was going on within its own confines. The movements of these primitive beings were the *quick*, impulsive movements of wild animals, not the slower, directed movements of man; they were nonconscious movements, not conscious. But the nonconscious were the forerunners of the conscious.

In these movements of the pre-man, and of his immediate descendant, the two sides of the body participated equally; they were not differentiated as they are in the man today. All

the movements were synchronized, and the two sides acted together as a whole. Not that the animal was ambidextrous. He was neither right-sided nor left-sided; *he was undextrous*. He used either side with equal facility; and, as a rule, he used both sides together. His radius of action, therefore, was limited; being reflex it was inflexible.

This may be observed today. Watch the monkeys at any Zoo. In using the hands in any ordinary capacity, to pick fleas, to scratch themselves, or to reach for anything, they use one hand as easily as the other. If they are suddenly startled they turn like a flash and jump for the side of the cage farthest from the noise, clutching it with all four extremities at once; or, if for the perch, by both hands simultaneously, not glancing toward the seat of supposed danger until they are over the first alarm. Their actions are typically reflex; they are spontaneous, quick, *undirected* muscular coordinations.

But now, as time goes on, the difference between the pre-man and man becomes wider and wider; the behavior of the animal is changing more and more, this change being due mainly to a wider use of his fore extremities. The animal now is using these extremities as hands, and, what is more to the point, as differentiated hands. Changes in his environment have placed before him increasingly difficult problems, the solving of which demanded two things: dexterity and thought. Under the new conditions he was forced to adopt different measures to preserve his own life. Where before life had been easy, now he actually had to work for a living, *to work with his hands*. And in the process the two hands became differentiated; that is, each hand approached its tasks from a different angle; they no longer were one in their actions, they were individualized. And this new hand work created new brain centres; for as the hands developed new uses, the brain followed that development. The body and the brain developed together, for the two are one and inseparable. And, so, out of the pre-man and primitive man came man, *thought man*; but he was, even then, little better than his ancestors. He was still more animal than man, an animal in whom the grosser attributes of the brute were still the dominant attributes; being the older part, and consequently the better developed, they actually were him. His brain was not yet in that state of development that gave to it the power to recognize values; the animal had not yet come into real consciousness. In fact, the degree of consciousness was very small; but the change had begun, and it was not to stop. Man had taken hold of the brute, and nothing could shake him off.



I have said that it was environment that developed man; and now I say that it was the fear of environment that developed him. Analyzing the environment of primitive man we find that that actually was so; we find that fear was the urge that impelled him forward, that impelled him to use his hands. Fear beset man upon every side; the fear of wild beasts, the fear of his stronger fellows, the fear of starvation, and the fear of the elements; literally, the fear of environment. It was this fear that begat thought. The man had to think in order to win against his environment. Mere reflex action was not now enough; thoughtless action, no matter how quick, could not avoid the new dangers; it now became necessary to understand the danger and to plan ahead of it, *it now became necessary to think*. The association of ideas brought about through the fear reaction was creating a thought reaction. This was, of course, a weak reaction in the beginning, it was little more than a complementary impulse following in the wake of a stronger impulse; but it *was* a beginning, and, as time went on, it gathered unto itself greater and greater power. And, as the power for thought increased, the motor reflex slowed down; the quickness of the animal gave place to the deliberative effort of the man.

The primitive brain had for active centres only those having control of the special senses, and those in the so-called motor area; the primitive brain was, almost wholly, a motor brain, as we have seen. Outside of the regions given over to the five senses, the regions of the brain concerned in the motor reactions were those convolutions in immediate relation to the great central fissure, the precentral and the postcentral convolutions. And these areas remained the solely active areas until the brute began to give place to the man. Then, in response to the new movements called forth by the new conditions, new areas came into activity. These new movements while proceeding through the primitive motor region, carried the brain effort beyond that. The new movements were different from the old, were finer, requiring a differentiation in muscular action and a new co-ordination in the actions of the individual muscles. This was, in fact, the individualization of the muscles themselves. And for this the old automatic centres would no longer suffice, for automatism could not direct; automatism was nothing more than reflex action. The new movements called into play a new force, a directing force, a force to which we give the name *thought*. Thought made possible the coordination and the slower and the finer actions of the muscles. Take, for instance, the development of writing. The beginning of writing was

in the drawing of straight lines and the approximation of one line to another. To the hand without a mind behind it the straight line is next to an impossibility, and the even joining of two lines an actual impossibility. But the *man in the brute* did accomplish these tasks; and then it became comparatively easy to proceed to the making of a square and a circle; and, after these it was but a step to picture writing, and a further step to the writing with letters.

This development was progressive, covering, no one knows how many thousands of years. It called into action, first, the old muscle centres in the precentral region, then a new centre in the convolutions closely adjacent to the first, and, third, another new centre in the convolutions anterior to the last. And these were not independent centres, isolated from the others; these centres were linked one with the other through the association fibres. Through these fibres the actions of the centres were synchronized. There is here what appears to be a regularly advancing developmental process. New areas come into development to receive and to direct the new sensory stimuli coming into the brain; but the new areas did not spring into existence spontaneously, not all of them together, at the same moment. This process of brain development was a slow one, covering a vast period of time, for there were many centres to be brought into function through the development of new cells and fibres. There were too many complexities to be worked out.

We are beginning to grasp the meaning and the method of brain development in the study of the developing brain, and in the study of comparative brain anatomy. As we have seen, the structural likeness between the man brain and the chimpanzee brain is very suggestive; the difference between them being mainly differences of degree. And study of the developing brain reveals how the various centres have come into action one after the other. Through this we learn that the cells in the centre for smell in the lobus pyraformis are the first to develop, and its fibres the first to become sheathed; and that the sensori-motor areas are the next. But we learn here, too, that, while the smell centre is the first to begin, the sensori-motor centres fast outstrip it. Then follow, in successive order, sight and hearing. It is only after the completion of these primitive centres that the intellectual areas develop. It becomes obvious, then, that the order of the brain is, first, primitive brain and, then, modern brain: first, reflex brain, then, thought brain; first brute, then, man.

The brain now has passed beyond the primitive stage. It

is not now an organ in which an incoming stimulus merely excites an automatic reply; it is a brain in which the stimulus is received, *considered*, and a reply, or no reply, is given, as the *reason* of the individual directs. Theoretically this gives to man the ideal brain.

But now, there is a conflict here. This ideal brain is not ideal; its judgments are not always the judgments to be looked for. Its action is not yet well balanced; all of its centres are not equally efficient, the irregularity being due to an unequal development. That is, the age of the various centres varies. For instance, the centres in the precentral convolution are the oldest of the centres, those in the immediately adjacent centres are the next oldest, and those in the area before the last are the youngest. In other words, reflex muscle-action is first, special muscle-action is next, and directed muscle-action last.

And there lies the conflict. Reflex action, impulse action, dominates the brain. It has become a habit-action; and habit-action is master-action. Thought-action has two weaknesses; its period of development has been a short one; and, it has followed the pattern of its parent, the older reflex. *These weaknesses are very strong ones*, for it is these *weaknesses* that dominate the thought function. Thought having developed through the reflex remains only reflex thought. There is here a grave defect, for, it means that, when a sensory impulse demanding thought enters the cerebral cortex, the response comes back through a reflex arc. There is no real thought attached, only a reaction along the easiest way; it is just loose reflex action. This leads often to a bizarre and disjointed thought effect, for, the thought images nearest in line are the ones most apt to respond to the impulse. This is not real thought, for there is no control of the response, no directing of the thought images into logical lines. Thought is as yet too weak to direct. The response will be according to the experience of the individual, according to his past. This means, in the ultimate, that reflex thought is merely an expression of the past. True thought is this, too; but, on the other hand, true thought is greater than this; true thought is more than just loose reflex action. True thought is *direction*, is the power to direct; it is self-consciousness directing the response. It is the man brain directing the brute brain: it is the Present directing the Past. In the last analysis, then, it is the Present, for the man epoch is the present epoch of the brain. It will not be difficult to understand from this how the Past, being older and stronger than the Present, will dominate the Present; how the reflex will dominate thought.

Mind, then, becomes a reaction between Past and Present. In this reaction there are many variations of degree leading to the different phases of mind; but in the normal mind the reaction must be equable. The present must counterbalance the past. On the contrary, if the past dominates, if the Past excludes the present, we have subnormal mind; or, if the present becomes the dominant power, we have exhibited the phase known as supernormal.

I have said that in subnormal mind the past excludes the present. Just what does that mean? How can the *present* be excluded? Actually, of course, the present may not be excluded, for, the present is all there is to life; the present closely surrounds us, environmental stimuli prick us upon all sides. But in the subnormal mind there is little or no response to the stimuli, the degree depending upon the developmental period of the brain behind the subnormal mind. Subnormal mind is the manifestation of subnormal brain, and proceeds from one of two directions: the fault may be one of structure, or one of function. Either the brain structures have not attained to a full growth, or, while they are complete structurally, they may not be functioning to their full capacity. In the latter, function may be restored, or, rather, brought out; while in the former there can be no mind manifestation beyond the period represented by the developmental stage. It becomes obvious, here, that the one form is not feeble-mindedness at all, for, if function may be restored, then the error is merely functional and not due to faults of growth. True feeble-mindedness, on the other hand, proceeds through a brain that is incomplete structurally; and, as it is the stage of brain development that determines the capacity of the mind, nothing can force the mind to an effort greater than the power of the brain behind it. In the congenitally feeble-minded the degree of mind impairment is the degree of brain lack. The brain lacks the power to respond to environmental stimuli, in fact, it might be said that a feeble-minded person is a person out of contact with his environment. It is doubtful whether the feeble-minded possess mind at all. Their mental reactions seem to be entirely reflex. They can do with their hands, but they cannot do with their heads; they can use their muscles, but they cannot use their brains. Their brains have been arrested in development, and, as this arrest has occurred before the brain has attained the man stage, its manifestation obviously cannot reach up to the man. But there is an attempt to reach up, the man cannot be entirely excluded, and the manifestation becomes, therefore, a mixed one, but, with the balance vastly in favor of the ani-

mal. The intelligence of the individual does not extend, in fact, beyond the intelligence of the animal. And, as the animal represents a past stage in the development of man, it must follow that the reactions of a brain in this stage of development can represent only the past. We have, then, to do with a brain that is out of touch with its environment, and dependent upon the past for its reactions; we have to do with a brain that has *structure* memory and not *conscious* memory. There is a brain, but the individual is no more conscious of it than he is of his other internal organs.

The feeble-minded individual, then, has no value beyond his own manifestation, a manifestation almost entirely of structure. The brain being the product of a million years, more or less, of slow effort, has had those million years woven into its structure. In the man, therefore, where the growth of the brain has been arrested, where there is no man consciousness to control its action, the action is going to proceed through those million years; that is, it is the structure built up by those slow-moving years that will give the trend to that brain. The action will be structure action, inflexible reflex action, not free, limitless thought action. The past manifests itself through that which it has reared; the present being excluded from participation in the manifestation.

But now, there are different degrees of feeble-mindedness; the exclusion of the present is in varying degree. There is the idiot, the imbecile, the moron: an ascending scale of feeble-mindedness. We have, in these ascending phases of mind, two things to consider: the influence of the dominant animal brain, and the influence of the latent man brain. While the past does dominate, there is an inward urge, a reaching out; there is the man effort exhibited in the attempt to pick up the stimuli of the encompassing environment. But this reaching out never gets beyond the stage in which the brain is set; the reach is never greater than the ability to reach. The reaction to environment is never greater than the ability of the brain to react.

In the lowest of these degrees of feeble-mindedness, the idiot, the individual may be said to be out of contact, out of conscious contact, with his environment; the brain-lack is more or less complete, varying from nothing to nothing plus. Where the brain-lack is complete we have, merely, a somatic animal, a feeding animal, not a brain animal; the individual is merely a collection of sustaining organs. In the attempt to study idiots of this degree we are baffled; not being conscious of their environment they cannot intelligently respond to it. We can

make no more of an impression upon them than we can upon wild animals. Their behavior is very animal-like. In some the disposition is mild, in some ugly; they make guttural sounds; they "bolt" their food, sometimes holding food or saliva in the mouth. If we speak to an idiot of this grade he gives no sign of understanding. In fact, he pays not the slightest attention to us, no more than if he did not hear. And he does not hear, that is, he does not hear the words, he does not understand words: not possessing language he cannot understand. He behaves as would any animal under like circumstances; he behaves as would any dumb brute who possesses neither language nor reason. On the other hand, an idiot of higher grade, one whose brain lack is lesser, is capable of making some response. This one, too, is unable to speak a single word, but he can understand, to a very limited extent, what is said to him. He comes when he is called; if we offer to shake hands with him he timidly places the fingers of one hand in ours; he even can make marks with a pencil upon paper, but the lines are meaningless, crossing and recrossing one another aimlessly.

What marks the difference between these two types? Is it not that in the second case, the idiot of high grade, there has been some *conscious* contact with environment? As a baby he was fondled and talked to, as all babies are; and his cortical cells were able to receive these stimuli, and to respond to them, up to a certain point. He thus received some training in the essentials of the man-brain up to the time when his brain ceased further to register impressions. But whatever that brain has learned, little as it may be, remains within its memory, remains as the merest rudiments of intelligence; and being rudiments they are reproduced as rudiments. It is characteristic of the brain, especially of a brain in the very beginning stage of development, that it reproduces as it has learned.

The idiot is an anachronism; he is an individual with his dates badly mixed; he belonged upon this earth half a million years ago. He exists in the past tense; he is the animal in whom the human manifestation is in the very beginning stage. The fact that the high grade idiot can understand some words, but not repeat them, proves one very obvious law of brain development: that sensory stimuli are recognized long before the brain is able to reply to them. This is, in very truth, the fundamental fact of development of cerebral cortex, as suggested by the researches of Flechsig and others on the myelination of the nerve fibres of the brain. Through these researches it has been discovered that the sensory fibres acquire

their sheaths before the other fibres, the motor fibres being second, and the association fibres last. It is a matter of common observation that, in developing function in the brain centres, it is necessary to send the developing sensory stimuli into the centres many times before they take on the function; it is necessary to put the centres through this training before they are able to act for themselves. It seems to be necessary that the centres receive this stimulation before their outgoing fibres, both motor and association, can come into usefulness.

Coming to the imbecile we reach another stage in the development of language: the imbecile not only understands words, but he also can repeat them: but he can understand many more than he can repeat. He has a vocabulary ranging from a very few words to several hundred, the number depending upon the degree of his imbecility. The words that he can repeat are those best suited to his immature brain; they are short words of one syllable, or, words of two syllables in which the two are easily pronounced, or, are similar, such as "papa" and "mama." With the words at his command he even can form short sentences; but in any of his uses of his words he is very uncertain. He does not always sound them correctly; he does not always put them together correctly; he does not always use them with good sense. Words are for him little more than bare sounds; they suggest little or nothing to his mind. In order to have any significance at all there must be an image that identifies the word in his mind. Mama is such a word; the image of the mother always accompanies it. As a baby the individual heard it constantly from his mother's lips; the word and the object were closely associated in the baby's mind. This constant association and this constant repetition indelibly impressed the word upon the baby brain cells. The baby learned the meaning of the word and how to use it; and even though the baby brain never developed beyond the baby stage, that which the brain had learned remained as an integral part of it. And, further, the imbecile can understand longer words than those he can utter; he can understand longer sentences than those he can repeat. This we should expect, knowing the manner of the development of the sensory fibres of the human brain. As in the high grade idiot we find the brain reaching out beyond its limit; it can receive far beyond its capacity to manifest. It is this reaching out, this ability to receive, that represents the human side of the brain; it is the backward pull, the inability to respond to the incoming stimuli, that represents the animal side.

And, as the imbecile differs from the idiot, in the matter of language, so does he differ from him in the matter of behavior. The ability to identify objects and to repeat the words representing them has given to him a wider horizon. His behavior is still the behavior of the animal, but the human touch, *the saving grace*, is now in evidence. Self-direction is now beginning to appear; the individual recognizes himself and his surroundings; his environment is making itself manifest. The reactions within the brain cells are coming into consciousness, but the consciousness here is only a beginning consciousness. It is unstable; one moment manifesting itself and the next seeming to fade away. This should not disturb us, for it is characteristic of brain development. That which seeks to establish itself in the human brain accomplishes its purpose through only laborious and uncertain effort.

As we proceed upward through the different degrees of feeble-mindedness we appreciate this more and more. More and more are the human attributes in evidence; but there is still that uncertainty of action. Consciousness has, indeed, a difficult path to travel. The reaction within these brains is, after all, more that of the reflex than that of real consciousness, of real thought. It is a touch-and-go consciousness, a momentary flash that but accentuates the blankness that follows in its wake. As the degree of feeble-mindedness lessens, the command of language increases. The vocabulary enlarges. Words take on real meanings; they become more flexible and are woven into longer and longer sentences. One sentence is followed by another and another; the individual can carry on a sustained conversation in which there is a logical argument; thought has become real to him. And his behavior level is rising also. His movements are becoming better coordinated, and his brain centres are acting in closer accord. In fact, the brain is taking command of the individual; thought is directing his activities. No longer do his muscles lead him into aimless contortions; no longer does he do ridiculous things with his person. The individual is now beginning to recognize himself; now makes the effort to control and to regulate his actions.

What is the one characteristic that marks the difference between the feeble mind and the strong mind? It is language, is it not? It is the same attribute that differentiates the man from the brute. Language is a man acquisition; through language man has completely isolated himself from the brute. If language were eliminated from the feeble-minded, that is, the cortical centre for language, those unfortunate individuals



would lose their human characteristics and become actual animals. And that is what almost happens in the lower grades of feeble-mindedness. Language gives fluidity to thought. It is possible to think without the use of words. But, without words, it is impossible to give expression to thought. This does not apply to the individual who, while in the full exercise of the power of speech, suddenly loses it; it has reference only to the individual, man or animal, who is born without language.

Leaving, now, the subnormal, let us consider the normal: the normal human brain. The beginning manifestations of the normal human brain, as we observe them in the infant and in the child, are very similar to the manifestations of the subnormal brain in the feeble-minded. The two hark back to the very beginnings of the human race; the brain of the child represents the early stages of the racial brain. The brain of the child is a motor brain, a brain of action, of reflex action, in which the thought faculty is just beginning to assert itself; it is the brain in which the animal and the man are commingled, but with the animal attributes in control. We should expect, then, that the manifestations of such a brain would be the manifestations of the period represented by its development; and so we find them. The animal attributes are in the ascendancy, while the higher faculties are in the primitive stage: thought, reason, speech and language are very imperfect. The reason for this will be easy to grasp if we understand the phylogenesis of man.

The life of man upon the earth may be divided into two periods: the ante-natal and the post-natal. The ante-natal period embraces a million years, more or less, and is the period of development of the merely animal brain, *the foundation of the man brain*; The post-natal period embraces the years that have gone into the development of the actual man brain from the animal brain. In the latter are included all the thousands of years between the present-day man and beginning man, as well as the few years of actual earth existence of the individual after his birth. Within these periods the man brain has developed; so, that, it is not at all surprising to find, in the brain of the individual, manifestations of the two periods, working side by side.

But, while these manifestations are working side by side, they are not working in harmony. It is true that, in the beginning, the animal attributes hold the advantage, but they find it more and more difficult to keep that advantage. The man attributes are there constantly endeavoring to obtain the mastery; but, being younger in point of development than the

others, they are handicapped, they have to fight to maintain a foothold. But theirs is a battle of time. If they are not able to win all at once, they are content with the mere foothold, knowing that, once the foothold is secure, it cannot be displaced. The placing of one foot leads to the advancement of the other; and so, step by step, with eternal patience, is their progress made. The animal attributes gradually are pressed back; but their retirement is attended by violent efforts at maintaining their positions. And it is this very violence that keeps them so much in evidence. Their manifestations are unequal, uncouth, explosive; they are merely undirected, reflex outbursts.

It is the influence of the higher faculties that is going to equalise the animal manifestations, that is going to refine them, that is going to tone them down. Impulsive reflex action is going to give place to deliberative action, to directed action; mind is going to rule, not brain. The Present is going to direct, not the Past. The individual is going to supervise his own brain development; he is going to learn how to put ideas into his brain to his own best advantage. The sensory stimuli are going to be received intelligently and assigned to their proper places. Out of instability is to come stability; out of disorder, order.

But the Present must not be allowed to overdirect; the individual must not be allowed to become supernormal; too much emphasis must not be put upon the brain during its developmental period. The supernormal brain is a brain in which the congenital development of the cerebral structures is advanced beyond the normal period. It is one in which self-consciousness develops too early, in which the reach is beyond the present; the supernormal is a projection into the future. There is a supernormal development of the brain structures, through which the brain centres become abnormally responsive to sensory stimuli. The incoming stimuli are picked up with avidity and thought is excited without effort. The mechanism approaches perfection in its action; the brain cells are ready, and eager, for work; the association fibres have taken on premature activity and are ready for the transmission of correlating impulses between the centres; the motor fibres, in alignment with the others, transmit the outgoing impulses without hesitancy and without error. This brain, acting in the present, is acting only as a future brain can act.

But all this is not so well as it appears; perfection has arrived too early. Brain development must not be pushed beyond normal limits; *the centres of the human brain must not*

*be put under forced development.* Normal development is slow development. The normal brain is not born already developed; *it is born to be developed*, and the period of that development is an extended one. In developing a normal brain we must follow the developmental plan of Nature or we shall encourage disaster. The supernormal brain, the brain that has received a too early development, easily is thrown out of balance, and is less apt to endure. The force that directs the upbuilding of a human brain, though slow moving, is a tremendous force. If we attempt to crowd it, to increase its progress, we have to increase its rate: we have to increase the pressure upon the immature brain cells. These cells are the highest form of living tissue; they are the most highly specialized of all the cells of the human body. They possess, then, in the highest degree, that quality peculiar to all living cells known as irritability. If, then, these cells are pushed in their development, if they are urged beyond the normal rate, it is natural to suppose that this irritability is increased. That being so, the cell itself must suffer some injury. And that seems to be the fact in the supernormal, for the supernormal individual, while he may give splendid service for the time, gives out early, and, moreover, his service is apt to be irregular. His cells, having come into full maturity prematurely, have shortened their existence that much; and, having to carry on their further existence under pressure, are shortening it still more, as well as manifesting irritation symptoms that are the direct outcome of the over-pressure. In the supernormal the Present, not content with its own progress, projects itself into the Future: *the Present devours the Future.*

The behavior of a supernormal individual is in accord with the over-development of his brain. His bodily activities keep pace with his mental; his muscle responses are quick, spontaneous and over-abundant. All the cells of his body are participating in the over-activity, all are rushing, with headlong speed, to their fate.

In conclusion:

In approaching the human mind we must remember its phylogensis; we must remember that the human mind comes through the human brain, the man brain, and that the man brain is the immediate descendant of the brute brain. If we wish to develop mind in a modern individual we must remember that mind has developed through the motor functions of the animal brain, through a process ages long. Our first concern is the brain; and, whether an individual *be born* subnormal, normal

or supernormal, we must have a knowledge of brain development before we can hope to understand his mind.

In the subnormal, in the feebleminded, (feeblebrained might be a better term) it is doubtful if we have to do with mind at all, for, here, the manifestations are almost entirely motor. Being motor, the results will be motor; that is, the results will follow through reflex action, not through thought action. In the endeavor to help the feebleminded the aim is to accelerate brain action; but we can hope for no great result in a brain whose development has been arrested. *The Past is inflexible and may not be advanced beyond its own limits.*

In the normal human brain much the same condition confronts us, but there is a difference. The motor function still dominates but it is not the only influence present. The man influence, the thought function, shows itself early. We have here an actively functioning brain following the normal course of human brain development. In this brain it is possible to appeal to reason, to bring the motor function and the thought function into close and intelligent cooperation. *The Present is flexible and may be moulded.*

In the supernormal individual, function is too rapid, and must be slowed down; the appeal to reason is just as necessary here as it is in the normal. *The Projection-Future, being overflexibility, must be restrained within sound limits.*